Say It With Pictures:

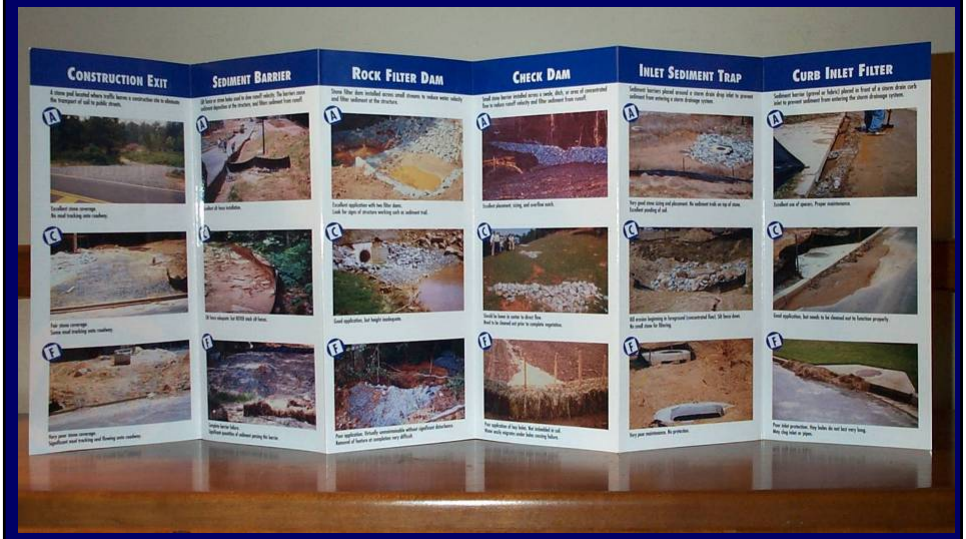
Training Kentucky Field Personnel on Construction Site Erosion and Sediment Control Techniques

Tetra Tech

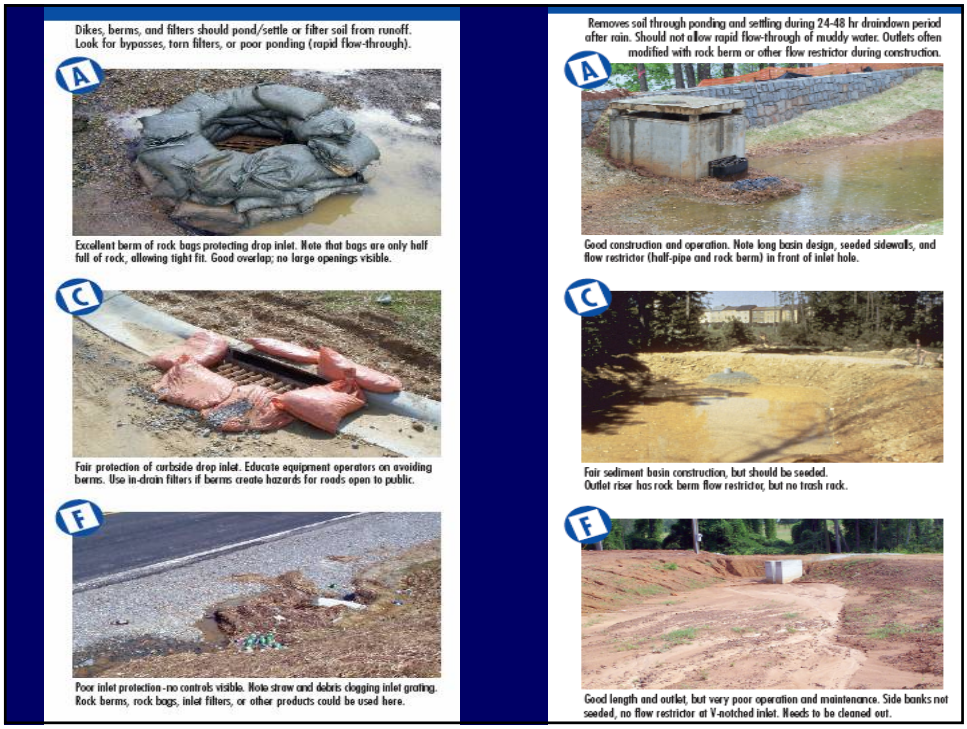
What we found . . .

- Some existing field guides are “too engineery”
  - BMP drawings are too technical
  - Information is too detailed
  - Text is too dense for field personnel
- ESC guides assume that field personnel know where BMPs should be placed . . . but do they really know?
  - Silt fences should be installed <u>below</u> bare soil areas
  - Concentrated flows should be intercepted/slowed where possible
  - Small sediment traps: great for temporary protection; not used
- Pictures of good/bad BMP installations are preferred
- Simple color drawings of basic concepts and practices are easier to understand than detailed technical drawings
- Regulatory and compliance information should be simplified, summarized, and moved to the back of the guide
- Guide should fit into a pocket, be waterproof, and easy to browse for specific information.

What the target audience liked



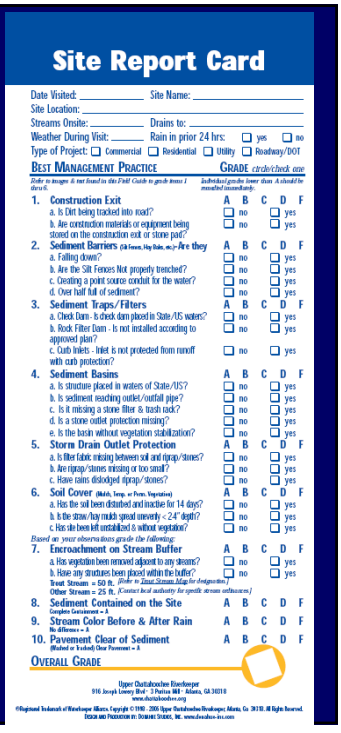
Source: Upper Chattahoochee Riverkeeper Soil Watch Program (www.chattahoochee.org)



Site Report Card From UCRK

Volunteer monitoring personnel review and evaluate BMPs

Results reported to contractor and/or regulatory agency



Site Report Card

Date Visited: _____ Site Name: _____
Site Location: _____
Streams Onsite: _____ Drains to: _____
Weather During Visit: _____ Rain in prior 24 hrs: ☐ yes ☐ no
Type of Project: ☐ Commercial ☐ Residential ☐ Utility ☐ Roadway/DOT

Best Management Practice — **Grade** *circle/check one*

Refer to images & text found in the Field Guide to grade items 1 thru 6. *Individual grades lower than A should be remedied immediately.*

1.	**Construction Exit**	A	B	C	D	F
	a. Is Dirt being tracked into road?	☐ no			☐ yes	
	b. Are construction materials or equipment being stored on the construction exit or stone pad?	☐ no			☐ yes	
2.	**Sediment Barriers** (Silt Fences, Hay Bales, etc.)- Are they	A	B	C	D	F
	a. Failing down?	☐ no			☐ yes	
	b. Are the Silt Fences Not properly trenched?	☐ no			☐ yes	
	c. Creating a point source conduit for the water?	☐ no			☐ yes	
	d. Over half full of sediment?	☐ no			☐ yes	
3.	**Sediment Traps/Filters**	A	B	C	D	F
	a. Check Dam- Is check dam placed in State/US waters?	☐ no			☐ yes	
	b. Rock Filter Dam - Is not installed according to approved plan?	☐ no			☐ yes	
	c. Curb Inlets - Inlet is not protected from runoff with curb protection?	☐ no			☐ yes	
4.	**Sediment Basins**	A	B	C	D	F
	a. Is structure placed in waters of State/US?	☐ no			☐ yes	
	b. Is sediment reaching outlet/outfall pipe?	☐ no			☐ yes	
	c. Is it missing a stone filter & trash rack?	☐ no			☐ yes	
	d. Is a stone outlet protection missing?	☐ no			☐ yes	
	e. Is the basin without vegetation stabilization?	☐ no			☐ yes	
5.	**Storm Drain Outlet Protection**	A	B	C	D	F
	a. Is filter fabric missing between soil and riprap/stones?	☐ no			☐ yes	
	b. Are riprap/stones missing or too small?	☐ no			☐ yes	
	c. Have rains dislodged riprap/stones?	☐ no			☐ yes	
6.	**Soil Cover** (Mulch, Temp. or Perm. Vegetation)	A	B	C	D	F
	a. Has the soil been disturbed and inactive for 14 days?	☐ no			☐ yes	
	b. Is the straw/hay mulch spread unevenly < 2-4" depth?	☐ no			☐ yes	
	c. Has site been left unstabilized & without vegetation?	☐ no			☐ yes	

Based on your observations grade the following:

7.	**Encroachment on Stream Buffer**	A	B	C	D	F
	a. Has vegetation been removed adjacent to any streams?	☐ no			☐ yes	
	b. Have any structures been placed within the buffer?	☐ no			☐ yes	

Trout Stream = 50 ft. *(Refer to Trout Stream Map for designation.)*
Other Stream = 25 ft. *(Contact local authority for specific stream setbacks.)*

8.	**Sediment Contained on the Site** Complete Containment = A	A	B	C	D	F
9.	**Stream Color Before & After Rain** No difference = A	A	B	C	D	F
10.	**Pavement Clear of Sediment** (Washed or Treated) Clear Pavement = A	A	B	C	D	F

Overall Grade _____

Upper Chattahoochee Riverkeeper
916 Joseph Lowery Blvd • 3 Puritan Mill • Atlanta, GA 30318
www.chattahoochee.org

"We want you to focus on the basics"

- Rock-lined entrance/exit to paved road
- Silt fences below bare soil areas
- Bare areas mulched or seeded quickly
- Blankets or mats on long, steep slopes
- Ditches stabilized with grass, rock, mats
- Curb inlet filters or ponding dams
- Sediment traps/basins at downhill sites

Technical advisory committee: putting it all together

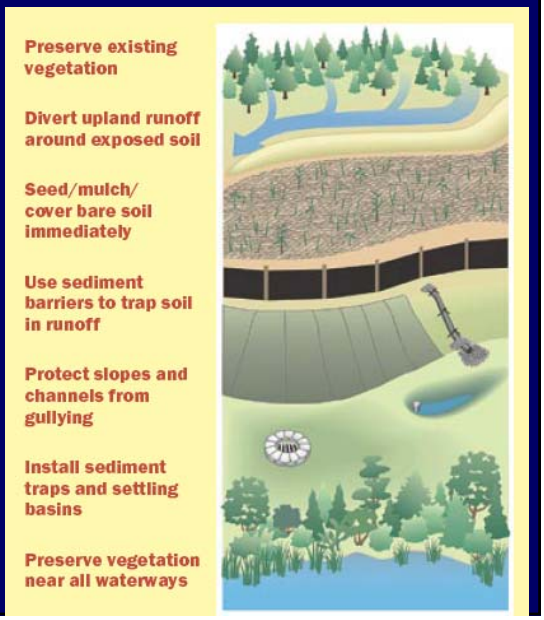
- *Bruce Scott, KY Division of Water*
- *Tom Gabbard, KY Division of Water*
- *Joe Ferguson, KY Division of Water*
- *Jennifer Thompson, KY Div. of Conserv.*
- *Carolyn Hestand, KY Div. of Conservation*
- *David Waldner, KY Transportation Cabinet*
- *Stephen Bowling, KY Transportation Cabinet*
- *Ray Werkmeister, KY Transportation Center*
- *Kurt Mason, USDA NRCS*
- *Charles Farmer, USDA NRCS*
- *Mary Kathryn Dickerson, Boone, Kenton, Campbell Cons. Dist.*
- *David Uckotter, Lexington Fayette Urban Co. Govt.*
- *Randy Stambaugh, Metropolitan Sewer District*
- *John Lyons, NKY Sanitation District # 1*
- *James Kipp, KY Water Res. Research Inst.*
- *Lindell Ormsbee, Tracy Farmer Ctr. for Env.*
- *Laura Wagers, KY Association of Counties*
- *Henry Duncan, UK Cooperative Ext. Svc.*
- *Richard Warner, UK Cooperative Ext. Svc.*
- *Judy Petersen, KY Waterways Alliance*
- *Russ Barnett, KY Inst.for Sustainable Dev.*
- *Michael Berthurem, KY League of Cities*
- *Juva Sizemore Barber, Home Builders Association of Kentucky*
- *Richard Walker, Tetra Tech*
- *John Kosco, Tetra Tech*
- *William Marshall, Tetra Tech*

What we came up with

- 100 page, laminated KY ESC Field Guide
- Lots of color pictures & simple drawings
- Tables and summaries of technical info
- Pocket-sized
- Easy to use
- $5 per copy
- 15,000 printed (5 print runs)

"Show them where things go"

- Conceptual drawing of BMP locations
- Top-to-bottom overview of site
- Chapter topics follow same order

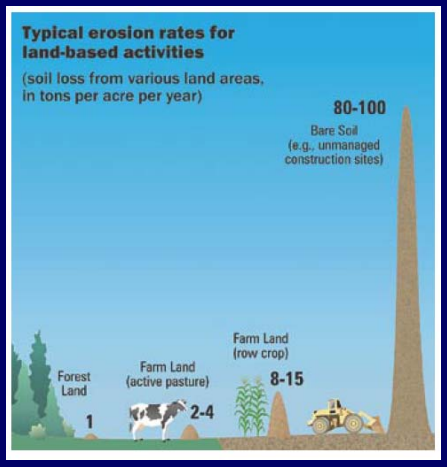


Chapter headings from KY ESC Field Guide

Note: Regulatory info moved to appendices

Table of Contents

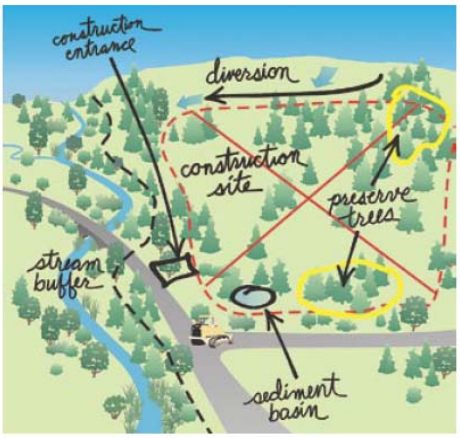
Using graphics to convey info



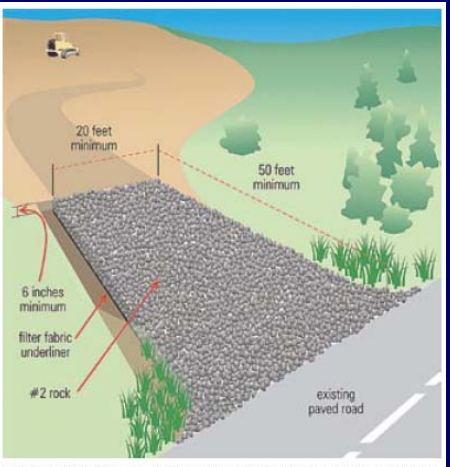
Prioritization of erosion and sediment controls for construction sites

Practice	Cost	Effectiveness
Limiting disturbed areas through **phasing**	$	
Protecting disturbed areas through **mulching and revegetation**	$ $	
Installing diversion around disturbed areas.	$ $ $	
Sediment removal through **detention** of all site drainage	$ $ $ $	
Other **structural controls** to treat sediment-laden flow	$ $ $ $	

Easy-to-understand drawings

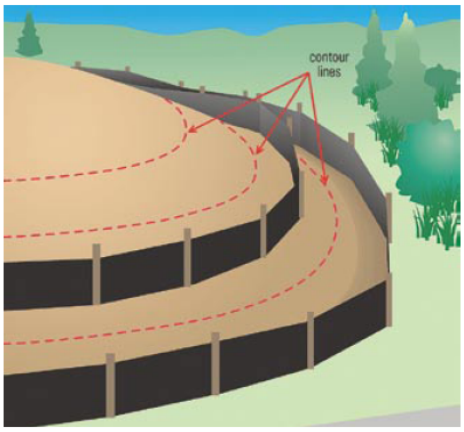


Identify drainage areas and drainage ditches and channels. Install diversions, grassed channels, sediment traps/basins, downslope sediment barriers, and rock construction entrance before beginning work.



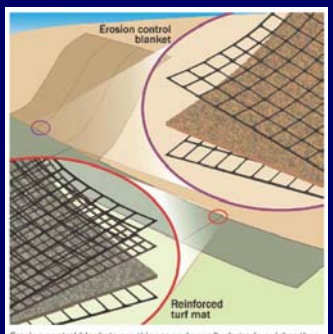
Construction entrance detail. Entrance/exit pad must keep mud from tracking onto paved roads.

- Place filters on downhill edge of bare soil areas.
- Make sure the filter catches all the muddy runoff.
- The goal is to pond runoff, to filter and settle it out.
- Install multiple sediment filters on long slopes.
- Spacing on long slopes is every 60 to 110 feet.
- Put filters across slopes, on the contour (level).



Silt fences should be installed on the contour below bare soil areas. Use multiple fences on long slopes 60 to 80 feet apart. Remove accumulated sediment before it reaches halfway up the fence.

Silt fences don't have to be on the property line. Placing them on slopes with the ends turned up to trap sheet flow provides better performance. Stagger fence sections to ensure total coverage. Clean out before sediment reaches halfway up. Repair as needed, and remove when grass is well established.



Erosion control blankets are thinner and usually degrade quicker than turf reinforcement mats. Check manufacturer's product information for degradation rate (life span), slope limitations, and installation. Remember to apply seed, fertilizer, and lime before covering with blankets or mats!

What other factors affect erosion?

Rainfall frequency and intensity
Slope (steep = more; flat = less)
Soil structure and type of soil (silty = more erosion)
Vegetation (more vegetation = less erosion)

Erosion and sediment controls for muddy runoff:

- Soak it in—maximize seeding and mulching
- Sift it out—use silt fences or other filters
- Slow it down—don't let gullies form
- Spread it around—break up concentrated flows
- Settle it out—use sediment traps and basins

Summarizing technical & other info with tables

Need for erosion and sediment controls for various slope and soil conditions

	Soil Type		
Slope Angle	**Silty**	**Clays**	**Sandy**
Very Steep (2:1 or more)	*Very high*	*High*	*High*
Steep (2:1–4:1)	*Very High*	*High*	*Moderate*
Moderate (5:1–10:1)	*High*	*Moderate*	*Moderate*
Slight (10:1–20:1)	*Moderate*	*Moderate*	*Lower*

Sizing for flow dissipaters at culvert outlet

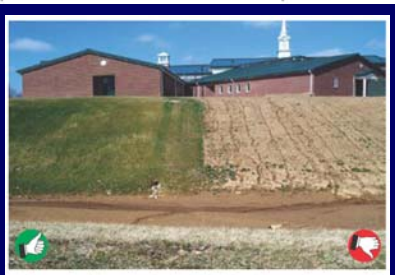
Culvert size	Avg. rock diameter	Apron width*	Apron length**	Apron length***
8"	3"	2–3 ft.	3–5 ft.	5–7 ft.
12"	5"	3–4 ft.	4–6 ft.	8–12 ft.
18"	8"	4–6 ft.	6–8 ft.	12–18 ft.
24"	10"	6–8 ft.	8–12 ft.	18–22 ft.
30"	12"	8–10 ft.	12–14 ft.	22–28 ft.
36"	14"	10–12 ft.	14–16 ft.	28–32 ft.
42"	16"	12–14 ft.	16–18 ft.	32–38 ft.
48"	20"	14–16 ft.	18–25 ft.	38–44 ft.

** Apron width at the narrow end (pipe or channel outlet)*
*** Apron length for slow-flow (no pressure head) culverts*
**** Apron length for high flow (pressure head) culverts*

. . . and pictures . . . lots of pictures . . .

Limiting the amount of bare soil exposed to the weather by working in phases reduces erosion and sediment control expenses.

Rock pad was installed properly with right sized rock, but lack of filter fabric underliner is causing rock to spread and sink into the soil. Note tracking of mud onto paved road. Mud tracked on roadways violates BMP standards, and is a potential legal liability.



Erosion and sediment loss is virtually eliminated on seeded areas (left side). Rills and small gullies form quickly on unseeded slopes (right).

Very good installation of erosion control blanket in seeded ditch below well-mulched slope on highway project.

Excellent use of concrete blocks and #57 rock for ponding dam to protect inlet. Note 2"x 4" board through blocks for stabilization. Note galvanized fencing and filter fabric between block and rocks.

Very good use of 20-inch plastic slope drain pipes to convey water from roadway to lower channel. Note staking and rock anchoring at bottom of temporary slope drain pipes.

Poor installation of silt fencing, fair to good seeding. Silt fence must be trenched in along bottom. Straw bales are not approved as sediment barriers.

Very good installation of multiple silt fences on long slope. Turn ends of fencing uphill to prevent bypass. Leave silt fences up until grass is well established on all areas of the slope. Re-seed bare areas as soon as possible. Remove or spread accumulated sediment and remove silt fence after all grass is up.

Lots of photos: examples & good, bad BMPs

Spacing for silt check dams

Ditch slope	Silt check dam spacing	Additional information
30%	10 ft.	Calculated for 3' high silt check dams.
20%	15 ft.	
15%	20 ft.	
10%	35 ft.	Center of dam should be 6" lower than sides.
5%	55 ft.	
3%	100 ft.	Use 5"– 10" rock, stone bags, or commercial products.
2%	150 ft.	
1%	300 ft.	
0.5%	600 ft.	

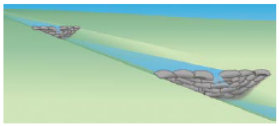
Silt check dams are spaced according to the slope of the ditch bottom (see table). Extend the ends of the silt check to the top of the bank to prevent bypassing and sidecutting. Keep the middle part lower and relatively flat so overflows aren't too concentrated and bypasses are prevented.

Lining steep ditches

Riprap is used to line sides and bottoms of steep ditches. Rock used in liners is mixed so the spaces between large rocks are filled with smaller rock. See table for rock sizing.

Rock sizing for ditch liners

Flow velocity	Average rock diameter
6 ft. per second	5 inches
8 ft. per second	10 inches
10 ft. per second	14 inches
12 ft. per second	20 inches



Silt check dams of rock, stone-filled bags, or commercial products must be installed before uphill excavation or fill activities begin. See table for correct silt check spacing for various channel slopes. Tied end of bag goes on downstream side.

Good placement and spacing of fiber-roll silt checks. Coconut fiber rolls and other commercial products can be used where ditch slopes do not exceed three percent.

Poor application of commercial silt check product. Check dam needs to be longer/tied into banks). More are needed, at correct spacing for channel slope. Area needs to be re-seeded; ditch may need blanket liner.

Poor silt check installation. Straw bales are not approved as silt checks for ditch or channel applications due to rotting, installation difficulties, and high failure potential.

Good sediment trap installation, but poor maintenance has caused trap to fill and bypass to occur. Remove sediment before trap is half full. Make sure containment dike has an overflow notch to control the discharge location.

Good trap location; needs cleaning out. Trap might be too small for area drained. Very good channel protection, seeding and mulching.

Fair to poor trap installation. Dike overflow notch is too deep; basin is too small. No seed or mulch covering bare soil areas.

Poor sediment trap construction. Dike is poorly built, without an overflow notch. Placement is too close to pond. No seeding or mulching evident in drainage area.

APPENDIX **A**

Federal and State KPDES Storm Water Permit Requirements

EPA regulations at 40 CFR 122.26(b)(14)(x) and 122.26(b)(15) require NPDES storm water discharge permit coverage for discharges from construction activities that disturb one or more acres. These nationwide regulations are implemented by general NPDES permits, which are issued by EPA and authorized State agencies such as the Kentucky Division of Water, which issues KPDES permits.

The KDOW KPDES Construction General Permit was developed to satisfy federal storm water permitting requirements. KPDES Construction General Permit meets all federal permit requirements and most of the requirements of local governments in Kentucky, though some local governments have additional requirements that must also be addressed by the applicant. See below for a summary of the KPDES Construction General Permit requirements, and Appendix B for a summary of some local government requirements.

The KPDES Construction General Permit covers all storm water discharges associated with construction activity that disturbs one acre or more. A copy of this permit can be downloaded from http://www.water.ky.gov/permitting/wastewaterpermitting/KPDES/storm/. The permit requires all construction activity in Kentucky disturbing one acre or more to:

- Submit a signed Notice of Intent (NOI) form to Kentucky Division of Water at least 48 hours before construction activity begins.
- Submit a copy of the NOI to the municipal operator of any municipal separate storm sewer system (MS4) the site discharges into.
- Develop and implement a "Storm Water Pollution Prevention (BMP) Plan."
- Continue to implement the plan during construction activity, including inspections every 7 days and after each rain of one-half inch or more.
- Submit a signed Notice of Termination (NOT) form to Kentucky Division of Water after the site has been finally stabilized.

APPENDIX **B**

ESC Plan Requirements for Local Governments in Kentucky

Some urban areas in Kentucky have specific requirements for filing earth disturbance plans prior to construction. Check with each local government prior to construction in urban areas to make sure your understanding of the permit requirements is up-to-date. Below is a summary of the requirements of the Metropolitan Sewer District of Louisville and Jefferson County, the Lexington-Fayette Urban County Government, and Sanitation District #1 in Northern Kentucky.

Louisville – Jefferson County Metropolitan Sewer District

On November 21, 2000 the Jefferson County Fiscal Court adopted an Erosion Prevention and Sediment Control (EPSC) Ordinance applies to all land disturbing activities in Jefferson County, including single family, commercial, residential and utility construction. Activities disturbing 5,000 square feet or less and not requiring a building permit, limited private development site investigations, and surveying prior to plan application are exempt.

The EPSC Ordinance requires that all EPSC measures be designed and installed to accomplish an 80% design removal efficiency goal for total suspended solids. The MSD Design Manual, Standard Drawings and Standard Specifications contain approved structural and non-structural Best Management Practices (BMPs) for use in achieving this standard. Structural BMPs include sediment trapping devices, inlet protection measures, perimeter controls and construction entrances. Non-structural methods include phasing a project into manageable pieces, scheduling activities within each phase to minimize amount of disturbed area and provisions for temporary and final stabilization. The Permittee, or his or her designee, is required to conduct inspections of all EPSC measures and perform any modifications, maintenance or repairs as necessary, every 7 calendar days and within 24 hours of each storm event that produces 0.5 inches or more of precipitation. Records of these inspections must be kept on site at all times for review by the appropriate compliance enforcement

APPENDIX **H**

Kentucky Construction Site Inspection Report

Kentucky Erosion and Sediment Control Permit Compliance Inspection Report

General Site Information:

COMPANY:	COUNTY:
SITE:	DATE:

Permit Compliance Information:

	Yes	No
Copy of permit kept on site		
Copy of Best Management Practices (BMP) Plan kept on site		
Site specific description of project timing/phasing and implementation		
Adequate site map showing:		
• Drainage patterns indicated on plan		
• Receiving waters (stream, river, lake, wetland, etc.) named		
• Approximate slopes after major grading		
• Area of soil disturbance		
• Undisturbed areas and vegetative buffer zones		
• Location of structural and non-structural controls (BMPs)		
• Areas where stabilization practices are to be employed		
• Storm water discharge locations		

Specific Site Information:

Name of receiving stream:	
Total area of site:	
Area disturbed:	

Inspection Results:

Inspection Criteria: Satisfactory, Marginal, Unsatisfactory	S	M	U
Condition of receiving stream			
Is BMP Plan adequately implemented?			
Timely seeding and mulching			
• Revegetation on cut/fill/cleared areas			
• Condition of slope areas			

Workshop series: 2003-2008

- Hosted and promoted/advertised by local agencies
  - Provided meeting room, snacks, projector, screen, registration
- Morning classroom sessions
  - Used photos & info from Field Guide
  - Group exercise with large color photos
- Afternoon field trip
  - Local construction site
  - Helpful tips for contractor
- 52 workshops held
- Total attendance ~2,500
- 15,000 Field Guides distributed
- Available from KY DOW at 502-564-3410

Certificate for attendees

Certificate of Training

This is to certify that

Joseph R. Fick

Has successfully completed instruction in the 2005 workshop series on

Fundamentals of Erosion Protection and Sediment Control

This workshop was developed for the Kentucky Division of Water and Kentucky Division of Conservation and sponsored by soil and water conservation districts and other partners from throughout the Commonwealth.

This training satisfies requirements for understanding the impacts of erosion and sedimentation on public waterways and property values, and understanding the principles and processes related to the installation and maintenance of erosion protection and sediment control Best Management Practices.

This project was funded in part by grant number C9994861-01 from the U.S. Environmental Protection Agency Under Section 319 of the Clean Water Act through the Kentucky Divisions of Water and Conservation to Tetra Tech.

SOIL CONSERVATION DISTRICTS of KENTUCKY — The Soil is in our Hands

In witness thereof:

Barry Tonning, Training Coordinator

EPPC Kentucky Division of Water

BMP Planning & Technical Specifications Manual: 2007

- 240 pages; full color
- Intro & background on construction site runoff
- BMP planning section
- Tech specs fact sheets
- Sample drawings; std. notes
- BMP plan template
- Inspection forms
- KY DOW regs & permit forms

Contents

2. Regulatory Considerations

This manual focuses on Best Management Practices for all construction sites, no matter how large or small. However, it should be noted that construction sites with a disturbed area (i.e., bare soil exposure) of one acre or more are subject to state and federal storm water regulations. Local regulations may also affect projects that are much smaller than an acre. The following sections summarize some of these statutory and regulatory provisions.

2.1 KPDES Storm Water Permitting

Public agencies at the federal, state, and local levels have implemented new rules to deal with impacts from the polluted construction site runoff issues summarized in the preceding section. These rules depend heavily on proper construction planning, knowledgeable field personnel, and common sense implementation of polluted runoff controls (i.e., BMPs).

EPA regulations at 40 CFR 122.26(b) (14) (x) and 122.26(b) (15) require National Pollution Discharge Elimination System (NPDES) permit coverage for storm water discharges from construction activities that disturb one or more acres. These regulations are implemented by general NPDES permits issued by EPA and authorized, in Kentucky, by the Kentucky Division of Water. The Kentucky Pollution Discharge Elimination System (KPDES) Construction General Permit meets all federal permit requirements.

Storm water pollution prevention (BMP) plans and KPDES permit coverage are required for all construction sites once acre or larger under 2003 regulations. Plans must be kept on site and available for inspections.

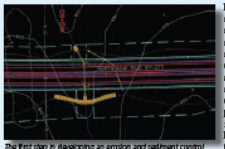
The KPDES Permit covers all storm water discharges associated with construction activity that disturbs one acre or more. This "one acre rule" includes all lots – even those smaller than an acre – in subdivisions or developments that will have more one acre or more of total disturbance, and long narrow projects such as buried pipelines/conduits/sewer lines if the construction width multiplied by the length would equal or exceed one acre. The area of disturbance is defined as only that portion of the site where ground cover and/or topsoil is removed, as contrasted to areas where tree or shrub clearing is the only activity. The definition of construction site applies equally to rural, suburban or urban areas but

2.6 Organizing and Phasing Large Projects: KY Transportation Cabinet Approach

Large construction projects should be organized via a logical sequence and phased to simplify and reduce management needs for controlling polluted runoff. This approach requires an analysis of the job site to identify work zones, activity sequences, and project phases. The Kentucky Transportation Cabinet (KY TC) has developed a procedure for organizing and phasing roadway construction that provides an excellent example of how this approach can be implemented.

Linear construction sites require special attention to drainage within—and into—the construction zone.

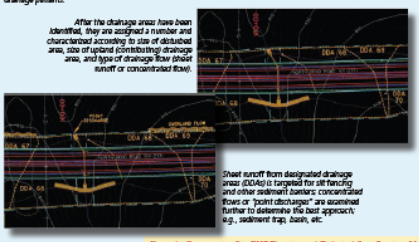
Plans are developed that show existing conditions overlaid with proposed construction grades and features—roadways, shoulders, and ditches, in this case. Designers are able to identify individual drainage areas along the right-of-way that will be disturbed as construction proceeds. These so-called 'disturbed drainage areas' (DDAs) are easily distinguished because they simply outline drainage catchments within the project area. After the DDAs are identified, designers will calculate the disturbed and upland drainage area within each and note whether they drain via sheet flow or concentrated flow. This information provides the basis for selecting appropriate BMPs—rock checks, traps, and basins for concentrated flows, and silt fencing, brush barriers, or other sediment controls for sheet flow.



The first step in developing an erosion and sediment control plan for highway corridors is to identify discrete drainage areas along the right-of-way by analyzing topography and general drainage patterns.

DDA area (size), flow pattern, and BMP selection are then incorporated into the site BMP plan. Traps and basins are sized to provide 3,600 cubic feet of total storage per disturbed acre. Areas that drain ten or more acres require additional analysis to determine whether or not site-level controls can handle the volume of runoff (i.e., 10 year storm) that may pass through the site. This analysis may indicate that clean water diversions, a larger sediment pond, or more sediment traps installed in series are needed.

After the drainage areas have been identified, they are assigned a number and characterized according to size of disturbed area, size of upland (contributing) drainage area, and type of drainage flow (sheet runoff or concentrated flow).



Sheet runoff from designated drainage areas (DDAs) is targeted for silt fencing and other sediment barriers; concentrated flows or "point discharges" are examined further to determine the best approach: e.g., sediment trap, basin, etc.

3. Developing a BMP Plan

BMP plans describe the site and how it will be managed, list the erosion protection and applicable housekeeping measures, and discuss how and when sediment and other controls will be applied as soils are exposed and site drainage is altered. BMP plans are required for sites with a disturbed area of one acre or more, but they are a good idea for all projects. The following sequence of activities is common to the development and implementation of all BMP plans in Kentucky:

1 Site Evaluation and Assessment
- Collect site information (soils, slopes, drainage)
- Produce map/drawing of existing site
- Create final project design map/drawing
- Measure the site area and drainage area(s)

2 Selection of Controls (BMP Plan Design)
- Review state and local requirements
- Select erosion and sediment controls
- Select controls for other runoff pollutants
- Indicate location of controls on map/drawing
- Identify the sequence of major activities
- Prepare the inspection and maintenance plan
- Identify all contractors and subcontractors

3 Permitting and Notification
- Assemble plan from previous activities
- Submit Notice of Intent (KPDES permit)
- Apply for local permits (if necessary)
- Distribute BMP Plan to contractors and subs
- Prepare to commence construction activities

4 Construction and BMP Plan Implementation
- Install basins, traps, drainage, sediment barriers
- Install exit, begin clearing and grading work
- Implement other controls as needed
- Inspect and maintain controls, document actions

5 Final Stabilization and Termination
- Stabilize all bare areas, slopes, and ditches
- Remove all temporary controls and trapped soil
- File Notice of Termination with KPDES
- Notify local government work is complete

What contributes to erosion?
- *Removing vegetation*
- *Removing topsoil and organic matter*
- *Reshaping the lay of the land*
- *Exposing subsoil to precipitation*
- *Failure to cover bare soil areas*
- *Allowing gullies to form and grow larger*
- *Removing vegetation along stream banks*

Example site drawings and BMP Plans

Please see Appendix B and Appendix C for examples of site drawings and BMP Plans needed to comply with KPDES Stormwater Permit requirements.

BMP Plan Checklist

Item	BMP Plan Elements
Site Description	• Nature and type of construction activity • Sequence of major soil disturbing activities (clearing, grading) • Estimates of the total project area and the total disturbed area • Post construction runoff coefficient • Existing data describing soil condition, discharges, etc. • Receiving water name and location (distance) • Soil types and locations • Construction area, time period, and general schedule • Location of BMPs and schedule for installation
Site Map	• Legend; property lines; existing/proposed contours; utilities • Ditches, streams, sinkholes, wetlands, lakes • Limits of construction and areas of no disturbance • Trees to be preserved • Existing and proposed buildings • Existing and proposed paved areas • Proposed pipes, inlets, and open channels • Location of runoff discharges and streams/lakes/wetlands • Construction entrances • Location of equipment storage areas • Location of soil stockpiles • Sediment basins and sediment traps • Silt fence and other sediment barriers • Diversion channels or berms upgradient of site • Other BMPs to be used on site • Inspection and maintenance notes
Erosion Prevention and Sediment Control Measures	*Soil Stabilization (seed, mulch, etc)* • Seed and mulch specifications • Bare areas idle for 21 days to be seeded/mulched *Perimeter Controls (silt fence, sediment ponds, etc.)* • Drawings and specifications showing dimensions and materials • Design criteria and calculations • Sediment basin for all areas draining 10 acres of disturbed area. (Sediment storage capacity must equal 3600 cubic ft per disturbed acre) *Storm Water Management Devices after construction is completed* • Measures to prevent erosion at culvert outlets and in channels/ditches • Measures to remove 80% of the TSS that exceeds predevelopment levels
Other Control Measures	• Measures to prevent discharge of debris and building materials • Measures to prevent off-site tracking of sediment • Measure to prevent dust generation • Other good housekeeping measures
Other State or Local Plans	• Identify local or other regulatory requirements • Demonstrate compliance with local requirements
Maintenance	• Description of BMP maintenance program
Inspections	• Frequency of inspection (every 7 days and after every rainfall of 0.5" or greater) • Documentation procedures for inspections • Documentation procedures for making repairs to BMPs
Non-Storm water Discharges	• Pollution prevention controls (e.g. gasoline or diesel fuel spills) • Good housekeeping measures • Disposal procedures for trapped sediment
Contractor and Subcontractor	• Name, address, and phone number of contractor & subcontractors • Certification statement from each subcontractor

Symbols Used to Denote BMPs

Page	BMP Categories and Specific Practices	Symbol
Site Preparation		
37	Land Grading	LG
40	Construction Exit	SCE
43	Temporary Diversion (Berm or Ditch)	TD TD DI
46	Topsoil Stockpiling	
49	Surface Roughening	SR
Soil Stabilization		
53	Temporary Seeding	TS
55	Permanent Seeding	PS
58	Mulching	M
62	Sodding	SO
65	Polyacrylamides	PAM
67	Dust Control	
Slope Protection		
69	Silt Fences	SF
71	Brush, Rock, and Other Sediment Barriers	CR CR
80	Erosion Control Blankets and Turf Reinforcement Mats	ECB TRM
92	Temporary Slope Drains	TSD TSD
95	Gabion Baskets and Mattresses	GA
100	Cellular Confinement Systems	

BMP purpose, effectiveness, and relative costs for various construction site runoff pollutants

Page	BMP Categories & Specific Practices	Purpose and Application	Relative Effectiveness	Relative Installation & Maintenance Costs	Sediment	Oil/ Grease	Nutrients	Toxics	Waste
Site Preparation									
37	Land Grading	Manage site clearing, excavation, and importation of fill material to minimize muddy runoff, preserve existing drainage system.	High	Low	●	○	●	○	○
40	Construction Exit	Keep sediment from being tracked onto public or other roadways. A rock pad of No. 2 stone is built where vehicles exit the site.	High	Low	●	○	○	○	○
43	Temporary Diversion (Berm or Ditch)	Prevent clean runoff from flowing through disturbed areas. Clean water from upslope areas is diverted around or through the site.	High	Low	●	○	◐	○	○
46	Topsoil Stockpiling	Preserve topsoil for later use when seeding & landscaping.	High	Low	●	○	●	○	○
49	Surface Roughening	Slow the velocity of water flowing down a slope and keep the seed and mulch in place. A dozer is operated up and down the slope to create small depressions with the tracks.	Moderate	Low	●	○	●	○	○
Soil Stabilization									
53	Temporary Seeding	Provide temporary vegetation and reduce erosion. Must be applied to areas where work has temporarily stopped after 14 days.	High	Low	●	○	●	○	○
55	Permanent Seeding	Provide permanent vegetation and reduce erosion. Must be applied within 14 days to areas that have reached final grade.	High	Low	●	○	●	○	○
58	Mulching	Reduce erosion, foster the growth of grass, and keep the soil moist by applying organic ground cover materials.	High	Low	●	○	●	○	○
62	Sodding	Quickly establish vegetation by using live, rooted mats of grass.	High	Low	●	○	●	○	○
65	Polyacrylamides	Reduce soil erosion by spraying the chemical binder on soil, or adding it to sediment basins to increase the settling of soil particles.	Moderate	High	◐	○	◐	○	○
67	Dust Control	Control fugitive dust emissions during dry weather on bare sites.	Moderate	High	◐	○	○	○	○
Slope Protection									
71	Silt Fences	Intercept sheet runoff and provide a place for water to pond, so sediment will fall out.	Moderate	Moderate	◐	○	◐	○	○

Site Preparation

Land Grading

The goal for land grading is to install necessary controls prior to clearing or cut/fill work, then get to final grade and seed/mulch as quickly as possible. Protect slopes and concentrated flow areas with extra controls as needed.

LG

Definition

Operations that remove vegetation—such as clearing and grubbing—and reshape the surface of the land through excavation or placement of fill material.

Purpose

Construct designed site drainage features, achieve site grades necessary for construction of roads, buildings, parking lots, and other site features.

Design Criteria

- All borrow and fill/disposal areas should be noted on the EMP plan.
- A phased clearing and grading schedule that minimizes the extent of the denuded areas and minimizes the length of time the areas are exposed should be developed and followed.
- Existing drainage features (swales, ditches, channels, etc.) and the vegetation nearby should be preserved wherever possible.
- Finished cut and fill slopes to be vegetated should not be steeper than 3H:1V unless erosion control blankets or turf reinforcement mats are used.
- Cuts or fills should not be so close to property lines as to endanger adjoining property—adequate protection against erosion, sedimentation, slippage, settlement, subsidence, and other damage must be implemented.
- Subsurface drainage should be provided to areas having high water tables to intercept seepage that might affect slope stability.
- Ditches and other drainage system features should be designed to safely convey increased runoff from cleared or developed areas without causing downstream channel aggradation, degradation, or increased off-site flooding.
- The site should be graded to direct flows to appropriate BMPs or other controls.
- Temporary structural controls installed during construction must be designed to accomplish maximum stabilization and control of erosion and sedimentation, and must be installed, maintained, and removed according to the specifications set forth in this manual.

Seed species & mixtures	Seeding rate/ acre	Per 1000 sq. ft	Soil pH	Other information
Lawns and other high traffic or high maintenance areas (mowed)				
Bluegrass	105 to 140 lbs	3 lb	5.5 to 7.0	Use wildflower mixes to save on mowing and watering costs. Do not establish grassed lawns near streams or wetlands – leave a 15 to 30 ft buffer of natural vegetation.
Perennial ryegrass (turf)	45 to 60 lbs	2 lb	5.6 to 7.0	
+ bluegrass	79 to 90 lbs	2.5 lb		
Tall fescue (turf type)	130 to 170 lbs	4 lb	5.6 to 7.5	
+ bluegrass	20 to 30 lbs	1 lb		
Channels and other areas of concentrated water flows				
Perennial ryegrass	100 to 150 lbs	3 lb	5.6 to 7.0	Seed ditches and channels thickly. Do not use fertilizer near ditch or channel bottom. Use erosion control blankets or turf reinforcement mats when channel bottom slopes exceed 3 percent.
+ white or ladino clover	1 to 2 lbs	2 oz		
Kentucky bluegrass	20 lbs	0.5 lb	5.5 to 7.5	
+ smooth bromegrass	10 lbs	.25 lb		
+ switchgrass	3 lbs	2 oz		
+ timothy	4 lbs	.25 lb		
+ perennial ryegrass	10 lbs	.25 lb		Silt check dams are needed when channel slopes exceed 5 percent or when channels begin downcutting (gullying) on the bottom. Do not use silt fencing or straw bales as silt check dams in channels with slopes greater than 3 percent; use rock or brush instead.
+ white or ladino clover	1 to 2 lbs	2 oz		
Tall fescue	100 to 150 lbs	3 lb	5.5 to 7.5	
+ ladino or white clover	1 to 2 lbs	2 oz		
Tall fescue	100 to 150 lbs	3 lb	5.5 to 7.5	
+ perennial ryegrass	15 to 20 lbs	0.5 lb		
+ Kentucky bluegrass	15 to 20 lbs	0.5 lb		

Inspection and Maintenance

Water the soil until the grass is firmly established. This is especially needed when seedings are made late in the planting season, in abnormally dry and hot season, or on sites with steep slopes or other adverse conditions.

Inspect all seeded areas for failures and make necessary repairs, replacements, reseedings, and remulching within the planting season.

If stand is inadequate, (less than 85 percent groundcover) seed over the site and fertilize, using half of the seeding rate originally applied, and apply mulch.

If stand is more than 60 percent damaged, reestablish the stand. Follow the original seedbed preparation methods, seeding and mulching recommendations, and apply lime and fertilizer as needed according to a soil test.

Hydraulically applied seed, mulch, tackifier, and soil amendments (e.g., lime, fertilizer) offer excellent results on a reasonable price on large sites, especially those with long, steep slopes. Follow manufacturer's recommendation regarding materials' mixing and application rates.

Seed ditches immediately after construction. Use mulch, netting, or erosion control blankets to protect newly seeded areas.

Soil Stabilization

Polyacrylamides

Long, bare slopes need to be stabilized. Polyacrylamide offers excellent temporary protection for slopes that will not be seeded or mulched immediately. Do not use near creeks, rivers, or wetlands. Follow manufacturer's instructions.

PAM

Definition

The land application or stormwater application of products containing anionic polyacrylamide (PAM), a chemical agent that binds soil particles together, which reduces erosion in the field and promotes coagulation and rapid settling in sedimentation basins.

Purpose

Land application of PAM is performed to reduce soil surface erosion due to wind and/ or water forces. Stormwater applications of PAM promote settling of fine soil particles in sediment basins. Polyacrylamides are applied directly – via liquid spray or hand or mechanical spreader for the dry product – to bare soil areas where the timely establishment of vegetation may not be feasible, or where vegetative cover is absent or inadequate. Such areas may include construction sites where land-disturbing activities prevent the establishment or maintenance of a vegetative cover. For stormwater treatment, PAM can be applied to stormwater as it enters sediment basins. This will cause soil particles to bind together and settle within the pond.

This temporary practice is not intended for application to surface waters or ditches that lead directly to surface waters. It is intended for application within construction stormwater drainage systems that feed into pre-constructed sedimentation (detention or retention) ponds or basins.

Design Criteria

Only the anionic form of PAM should be used. Cationic PAM is toxic and should NOT be used. PAM and PAM mixtures should be environmentally benign, harmless to fish, wildlife, and plants. PAM and PAM mixtures should be noncombustible.

PAM is typically applied at construction sites with temporary seeding and/or mulching on areas where the timely establishment of temporary erosion control is so critical that seedings and mulching need additional reinforcement. It may be used alone on sites where no disturbances will occur until site work is continued and channel erosion is not a significant potential problem. Permanent grassing applications can be better established using PAM as a tackifier and soil conditioner.

Anionic PAM is available in emulsions, powders, and gel bars or logs. Other BMPs must be used in conjunction or combination with anionic PAM, such as mulch, sediment basins, and eventually seed or other cover. The use of seed and mulch for additional erosion protection beyond the life of the anionic PAM is recommended. Repeat application if disturbance occurs to the target area. The following recommendations relating to design may enhance PAM use and help prevent problems:

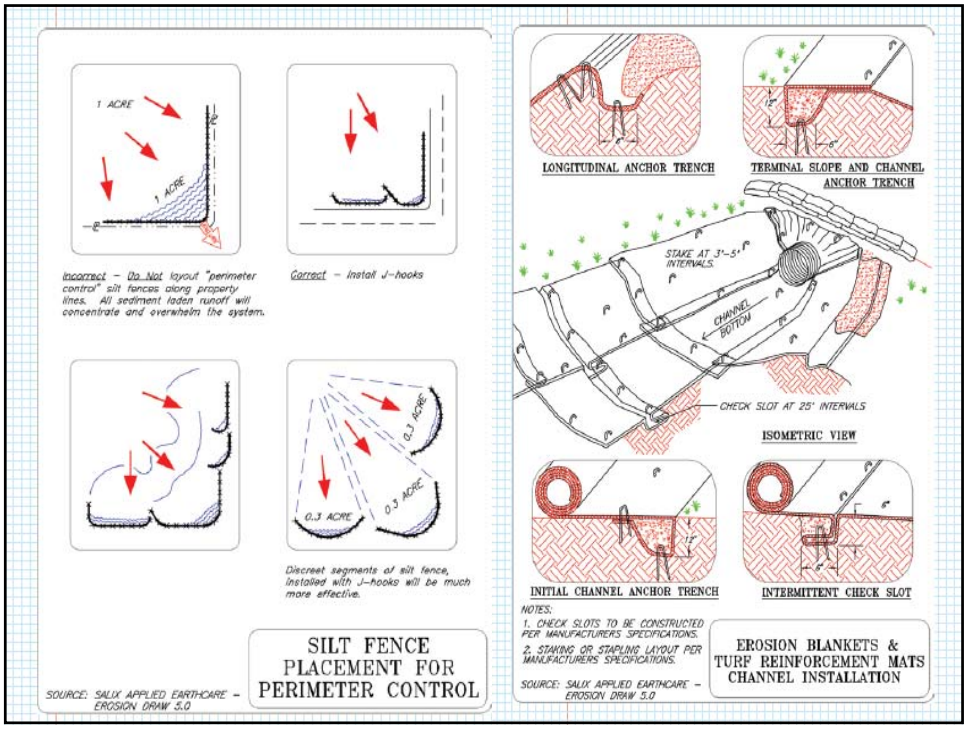
Use several short lengths of silt fence and J-hooks to intercept converging runoff in critical areas, such as property corner. This can help relieve stress and prevent failure at the corners.

Silt fence installed backwards—note that stakes are on the uphill, rather than downhill, side of the fabric. Ponding flows against the fence will push the fabric away from the stakes, causing failure and release of sediment to the small stream at the right.

Use multiple silt fences of proper spacing (see table) to protect long, unvegetated slopes. Fences provide only temporary protection, and can be removed when the area is seeded and mulched.

Silt fence is functioning well, but needs maintenance. Silt fences back from the toe of the slope, to allow room for sediment to accumulate and maintenance.

Good installation of "super" (i.e., wire-reinforced) silt fence. Note that wire is installed between the fabric and stakes, and provides a web of support as the ponded flow pushes against the fabric. Also, note the grass strip between the bare area and the fence, which helps to slow and filter flows prior to ponding along the fence line.



Slope Protection

Cellular Confinement Systems

Concrete and plastic cellular blankets; the thin open-celled concrete block product provide heavy armoring while supporting vegetation that softens the final look.

Definition

A three-dimensional, honeycombed, sheet, mat, or interlocking structure filled with soil and planted with vegetation used to stabilize the surface of earthen cut and fill slopes.

Purpose

Cellular confinement systems (CCS) are permanent erosion control practices intended to stabilize infill materials for slope and channel protection, load support, and earth retention applications. The expandable panels create a cellular system that confines topsoil infill, protects and reinforces the plant's root zone, and permits infiltration and natural subsurface drainage. The honeycomb shaped cells encapsulate and prevent erosion of the infill material. The cellular confinement systems are used for:

- ***Revetments:*** Filling the cells with topsoil or rock and vegetation can provide an alternative to hard armor revetment systems
- ***Erosion control on steep slopes:*** Cells can be filled with soil and vegetated or filled with granular materials. Slopes as steep as 1H:1V can be treated with cellular confinement systems. Application on steep slopes may require tendons for system stability and security against sliding.
- Flexible channel lining systems, either vegetated or rock filled.
- Road stabilization - cells confine and reinforce select fill materials, thereby increasing load-bearing capacities. Creates a porous pavement system with aggregate or topsoil/vegetation infill.
- Temporary low-water stream crossings.

Construction Specifications

Site Preparation

The surface of the slope should be leveled, with stones and debris removed. Gullies should be filled and well compacted. Major obstacles such as boulders can be left in place. Simply cut out panel around them.

Following excavation and fill placement operations, shape and compact the subgrade surfaces to the designed elevations and grades.

Excavate the area so that when cellular confinement systems are installed, the top of the section is flush with or slightly lower than the adjacent terrain or final grade.

Remove unstable subgrade soils when required and install geotextile underliner if specified.

Installation

Follow manufacturer's instructions regarding application type, slope limits, installation procedure, appropriate fill material, etc.

- Anchor the cellular confinement system sections at the top of the slope across a 2-4 foot ledge. Expand and stretch the cellular confinement system down the slopes.
- The type of anchors and frequency of anchoring will depend on site conditions. Typically, every other cell across the top section is anchored with J-pins or other suitable anchor devices. This anchoring pattern is repeated every 6 feet down the slope.
- The cells should be anchored securely in order to prevent deformation of the panel while backfilling. Depending on the slope angle and fill soils involved, intermediate anchorage will be necessary on some interior cells in order to limit sideways deformation, insure stability and avoid overloading the upper sections.
- Additional panels are abutted together and joined with staples, hog rings or other suitable fasteners.

Infill Placement

Place the fill material in the expanded cells with suitable equipment such as a back-hoe, front-end loader or conveyor.

- Limit drop height to 3 feet to reduce crushing force on cell material.
- On steep slopes, infill from the crest to the toe to prevent displacement and deformation of the cellular confinement system.
- Overfilling and compacting of infill depend on type and consistency of material and the depth of the cells.

Inspection and Maintenance

Inspect slope periodically and after significant rainstorms to check for erosion. Any failure should be repaired immediately.

If vegetation has not been established, fertilize and reseed damaged and sparse areas immediately.

Plastic cellular blanket installed on steep, long slope. Work closely with manufacturers on these applications to ensure proper design, installation, and initial maintenance.

Cellular concrete mat used to stabilize banks in a highly erodible silty loam soil. Double or triple sod these applications immediately after installation. Mulch may be needed to support seeded areas until grass is established.

Cellular blankets provide an aesthetic alternative to poured concrete walls and other armored installations

Stream and Wetland Protection

Bioengineering: Live Staking

Live stakes (cuttings) of willow or other selected hardwoods can be cut during the dormant season and driven into stream banks or shore areas to stabilize erodible soils. Note that some hardwood species require special preparation to ensure growth. All species require contact with moist soil along the lower portions of the live stake.

Definition

Live stake planting involves the insertion and tamping of live, rootable vegetative tree or shrub cuttings (e.g., willow, ash, alder) into moist streambanks in a manner that allows the stake to take root and grow.

Purpose

Live stakes create a root mat that stabilizes the soil by reinforcing and binding soil particles together and by extracting excess soil moisture. Growing stakes also provide physical armoring of streambanks against high velocity flows. This practice is commonly used in conjunction with other practices to provide for a more stable site condition (i.e., used to anchor blankets, coir mats, turf reinforcement mats, straw rolls, etc.). Live stakes can be used for the following:

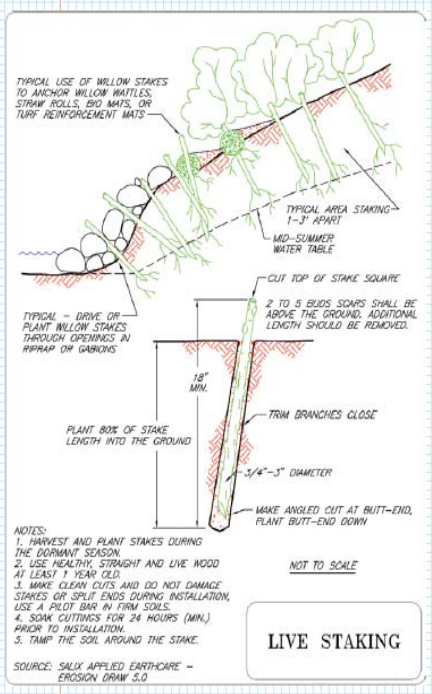
- Repair of small earth slips and slumps.
- Gullies and stream channels can be live-staked. Areas best suited to staking are the bottoms and banks of small gullies and bare gully banks.

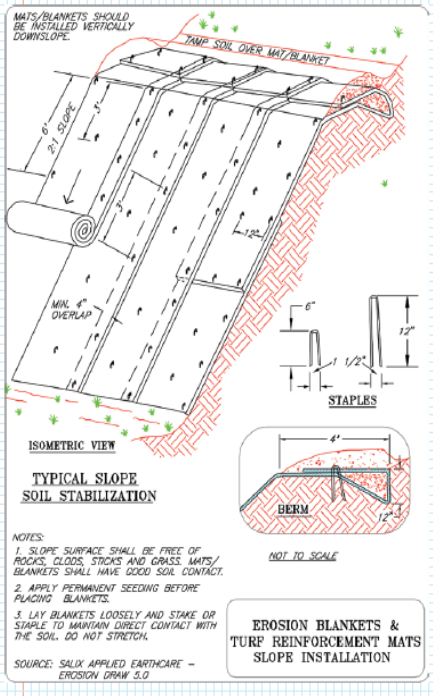
Vegetative Streambank Stabilization

Vegetative streambank stabilization, also known as bioengineering, includes a variety of measures designed to reduce erosion by installing protective vegetation and a few strategically placed structural components such as erosion control blankets, turf reinforcement mats, geotextiles, tree roots, and other materials.

Vegetative streambank stabilization can incorporate significant structural components such as gabion baskets and mattresses, slope toe protection rock, and cellular geogrid applications. However, the focus for this BMP is to minimize the appearance of so-called "hard armoring" such as rock and gabions and to maximize the "soft look" of trees, shrubs, and other vegetation. The selection, installation, and maintenance of vegetative material is the key to success.

All streambank stabilization practices, structural and vegetative, are subject to Clean Water Act Section 404 permit coverage issued by the U.S. Army Corps of Engineers and Kentucky Division of Water Clean Water Act Section 401 Water Quality Certification and Floodplain Permits.





Good Housekeeping and Other Runoff Controls

Material Delivery, Storage, and Use

A wide variety of construction site materials – such as soil amendments, fertilizers, paint, and fuels – can contaminate stormwater runoff if not stored properly. In general, storing materials under roof or covering with a secure tarp provides good protection against polluting construction site runoff. Job site supervisors should check for leaching or spreading of contaminants from fuel storage areas, landscaping stockpiles, and other places where potentially hazardous materials are stored.

Definition

Receiving, processing, storing, and using materials in a manner that minimizes the risk of spills and pollution of stormwater runoff.

Purpose

The purpose of material delivery, storage, and use is to prevent the material from being spilled or otherwise coming into contact with runoff.

Implementation

- Designate specific areas of the construction site for material delivery and storage
- Place material storage areas near construction entrance and away from waterways and storm drain inlets
- Where possible, place materials designated for outside storage in locations that will be paved
- Install containment berms or rock check dams between stored materials (topsoil, fertilizer, etc.) and site drainage system
- Minimize on-site storage of materials and schedule delivery of material for when it will be needed
- Minimize hazardous materials stored on-site
- Store hazardous or toxic materials in covered area or indoors if possible
- Provide secondary storage for materials
- Keep materials in original containers and labeled
- Keep containers tightly sealed after use
- Train employees and subcontractors

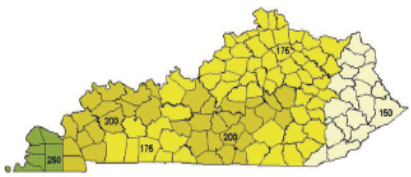
Keep hazardous materials under cover and over collection pans to prevent problems

Inspection and Maintenance

- Inspect material storage area weekly and after each rainfall greater than 0.5 inches
- Inspect material storage areas for cleanliness, spills and leaks
- Clean up spills promptly; keep spill kits nearby

EROSION CONTROL—UNIVERSAL SOIL LOSS EQUATION DR 1006-1

Table 1006-1-A
RAINFALL FACTOR, R by COUNTY



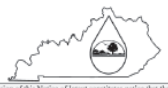
Counties with 150 R Factor				
Bell	Elliott	Johnson	Letcher	Morgan
Boyd	Floyd	Knott	Magoffin	Perry
Breathitt	Greenup	Lawrence	Martin	Pike
Carter	Harlan	Leslie		

Counties with 175 R Factor				
Allen	Clay	Kenton	Nelson	Shelby
Anderson	Estill	Knox	Nicholas	Simpson
Bath	Fayette	Laurel	Ohio	Spencer
Boone	Fleming	Lee	Oldham	Todd
Bourbon	Franklin	Lewis	Owen	Trimble
Bracken	Gallatin	Logan	Owsley	Warren
Breckinridge	Grant	Mason	Pendleton	Washington
Bullitt	Grayson	McCreary	Powell	Wayne
Butler	Harrison	Meade	Pulaski	Whitley
Campbell	Henry	Menifee	Robertson	Wolfe
Carroll	Jackson	Mercer	Rowan	Woodford
Christian	Jefferson	Montgomery	Scott	
Clark	Jessamine	Muhlenberg		

Counties with 200 R Factor				
Adair	Cumberland	Hart	Madison	Rockcastle
Barren	Daviess	Henderson	Marion	Russell
Boyle	Edmonson	Hopkins	Marshall	Taylor
Caldwell	Garrard	Larue	McLean	Trigg
Calloway	Green	Lincoln	Metcalfe	Union
Casey	Hancock	Livingston	Monroe	Webster
Clinton	Hardin	Lyon	Ohio	
Crittenden				

Counties with 250 R Factor				
Ballard	Fulton	Graves	Hickman	McCracken
Carlisle				

KPDES FORM NOI-SW



Kentucky Pollutant Discharge Elimination System (KPDES)
Notice of Intent (NOI) for Stormwater Discharges Associated with Industrial Activity Under the KPDES General Permit

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a KPDES permit issued for stormwater discharges associated with industrial activity. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit.
ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM (See Instructions on back)

I. Facility Operator Information

Name: | Phone:
Address: | Status of Owner/Operator:
City, State, Zip Code:

II. Facility/Site Location Information

Name:
Address:
City, State, Zip Code:
County:
Site Latitude: (degrees/minutes/seconds) | Site Longitude: (degrees/minutes/seconds)

III. Site Activity Information

MS4 Operator Name:
Receiving Water Body:
Are there existing quantitative data? Yes ☐ No ☐ If Yes, submit with this form.
If this facility is a member of a Group Application, enter Group Application Number:
If you have other existing KPDES Permits, enter Permit Numbers:

IV. Additional Information Required FOR CONSTRUCTION ACTIVITIES ONLY

Project Start Date: | Completion Date:
Estimated Area to be disturbed (in acres):
Is the Stormwater Pollution Prevention Plan in Compliance with State and/or Local Sediment and Erosion Plans? Yes ☐ No ☐

V. Certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Printed or Typed Name:
Signature: | Date:

Checklists for efficiency, standardization

Kentucky BMP Plan • Construction Site Inspection Report

Company:	**Site:**	**County:**
Site Operator:		**Inspection Date:**
Receiving Water:	**Total Site Area (acres):**	**# Disturbed Acres:**
Inspector Name:	**Inspector Qualifications:**	
Inspection Type: Weekly or ½ Inch Rain	**Days Since Last Rainfall** ____	**# Inches of Last Rainfall:** _____

Field Inspection Observations

BMP Category	Compliance Poor Fair Good	Field Indicators for Compliance
Project Operations		Notice of Intent (KPDES permit) and other local/state permits on file BMP Plan on site and available for review; project activities following BMP plan Weekly inspection and rain-event reports on BMPs available for review Diversions, silt checks/traps/basins, and silt fences/barriers installed prior to clearing Grading and clearing conducted in phases to minimize exposed soil areas No vegetation removal or operations in stream or sinkhole buffer area (25-50 ft min) Rock pad in place on all construction site exits leading to paved roads No sediment, mud, or rock on paved public roads in project area Dust control if needed when working in residential areas during dry conditions
Drainage Management		Upland runoff diverted around bare soil areas with vegetated/lined ditches/berms Drainage channels exiting the site are lined with grass/blanket/rock and stabilized Discharges from dewatering operations cleaned in silt fence enclosure or other filter No muddy runoff leaving site after rains up to 1½ inches
Erosion Protection		Exposed soil seeded/mulched after 2 weeks if no work is planned for the next 7 days Soils on steep slopes seeded/mulched/blanketed as needed to prevent rutting
Sediment Barriers		Silt fence, rock filter, or other sediment barrier below all bare soil areas on slopes Barrier installed across slope on the contour, trenched in, posts on downhill side Multiple sediment barriers at least 125 ft apart on unseeded slopes steeper than 4:1 J-hook interceptors along silt fence where heavy muddy flows run along fencing No visible undercutting or bypassing or blowout of sediment barrier Accumulated sediment is less than halfway to the top of sediment barrier
Slope Protection		Slopes tracked, disked, or conditioned after final grade is established Slopes seeded, mulched, or blanketed within 21 days, no unmanaged rills or gullying Heavy downslope flows controlled by lined downdrain channels or slope drain pipes No muddy runoff from slopes into streams, rivers, lakes, or wetlands
Inlet Protection		Inlet dam/device or filtration unit placed at all inlets receiving muddy flows No visible undercutting, bypassing, or blowout of inlet protection dam or device Accumulated sediment is less than halfway to the top of the inlet protection dam/device
Outlet Protection		High flow discharges have rock or other flow dissipaters of adequate sizing at outlet Culvert outlets show no visible signs of erosion/scour, bank failure, or collapse
Ditch and Channel Stabilization		No unmanaged channel bank erosion or bottom scouring visible within or below site Ditches with slopes more than 3% have check dams spaced as needed, if not grassed Ditch check dams tied in to banks, with center 4" lower than sides, and no bypassing Ditches with slopes of up to 5% are thickly seeded with grass (minimum requirement) Ditches 5% to 15% are lined with thick grass and erosion control blankets as needed Ditches 15% to 33% are lined with thick grass and matting or other approved product Ditches exceeding 33% are paved or lined with rock or other approved product

STARSHADER APARTMENTS
CONSTRUCTION SITE BEST MANAGEMENT PRACTICES (BMP) PLAN

SITE DESCRIPTION

Project Name and Location: (Latitude, Longitude, or Address)	Starshader Apartments 21 Broadview Avenue Center City, KY 40000	**Owner Name and Address:**	Pine Grove Development LLC 11 Main Street Center City, KY 40000
Site Manager and BMP Plan Contact Person:	Mark Smith, General Contractor, 404-111-1111 DBA Smith Homebuilders	**Project Start and End Dates:**	Start: January 1, 2007 End: December 31, 2008

Description: (Existing Site Conditions, Purpose, and Types of Soil Disturbing Activities)

The existing site is grassed pasture with rolling slopes <5%, some cedars, and no mature trees in the area to be developed. Soils are silty clays with good drainage. No streams are on the property. Rocky Creek is about 450 ft downgrade. No threatened or endangered species were found on the property. This project will consist of three low-rise, attached apartment buildings with adjacent parking facilities. Soil disturbing activities will include: clearing and grubbing; installing a stabilized construction entrance, installing perimeter silt fence and other erosion and sediment controls; grading; excavation for the sedimentation pond, storm sewer, utilities, and building foundations; construction of roadside drainage swales, roads, and parking areas; and preparation for final seeding and landscaping.

Runoff Coefficient:	Current Runoff Coefficient = 0.15; Final Runoff Coefficient = 0.45
Site Area:	The site is approximately 11.0 acres of which 9.8 acres will be disturbed by construction activities.

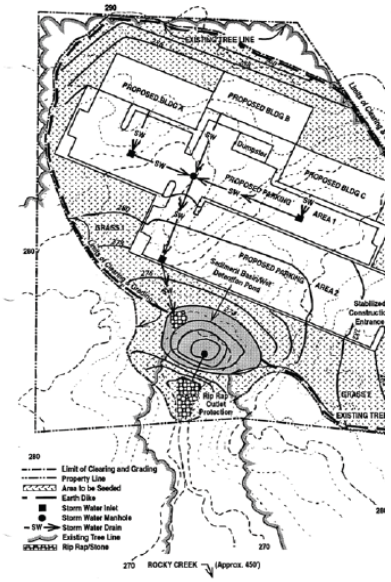
Sequence of Major Activities

Construction Activity	Schedule Consideration
Construction access - entrance to site, construction routes, areas designated for equipment parking	This is the first land-disturbing activity. As soon as construction begins, bare areas will be stabilized with gravel and temporary vegetation.
Sediment traps and barriers – basins, traps, sediment fences, outlet protecton	After construction site is accessed, principal basins will be installed, with the addition of more traps and barriers as needed during grading.
Runoff control - diversions, perimeter dikes, outlet protection	Key practices will be installed after the installation of principal sediment traps and before land grading. Additional runoff control measures may be installed during grading.
Runoff conveyance system - storm drains, channels, inlet and outlet protection, slope drains	There are no streams on site. Principal conveyance systems will be installed with runoff control measures. The remainder of the systems may be installed after grading.
Land clearing and grading—site preparation (cutting, filling, and grading, sediment traps, barriers, diversions, drains, surface roughening)	Major clearing and grading will begin after installation of principal sediment and key runoff-control measures, and additional control measures will be installed as grading continues. Borrow and disposal areas will be cleared as needed. Trees and buffer areas will be marked for preservation.
Surface stabilization—temporary and permanent seeding, mulching, sodding, riprap	Stabilization will begin within 14 days on areas of the site where construction has permanently or temporarily (for 21 days or more) ceased.
Building construction—buildings, utilities, paving	During construction, erosion and sedimentation control measures will be installed as needed, such as construction entrances and silt fence at back of curb and/or property line. Gravel areas will be installed for building material storage.
Landscaping and final stabilization—topsoiling, trees and shrubs, permanent seeding, mulching, sodding, riprap	This is the last construction phase. All open areas will be stabilized, including borrow and spoil areas. Temporary control structures will be removed and the area will be seeded and mulched.

Sample BMP Plan in KY Planning and Tech Specs Manual

Made available as a MS Word file template for homebuilders & small-time contractors

Site Drawing Showing Proposed Construction, Drainage Features, and BMPs



SITE DESCRIPTION (Continued)

Name of Receiving Waters:	The entire site will drain into Rocky Creek, which is approximately 450 feet from the site.
TMDLs and Pollutants of Concern in Receiving Waters:	Rocky Creek is not listed on the Kentucky impaired waters (303d) list; there is no TMDL for Rocky Creek. No threatened and endangered species are present in Rocky Creek downstream from the project discharge.
Potential Sources of Pollutants:	Sediment from land clearing and grading; concrete washout water; paint wash water; oil/fuel/grease from equipment; sanitary waste; trash/debris.

CONTROLS

Erosion and Sediment Control

Stabilization Practices

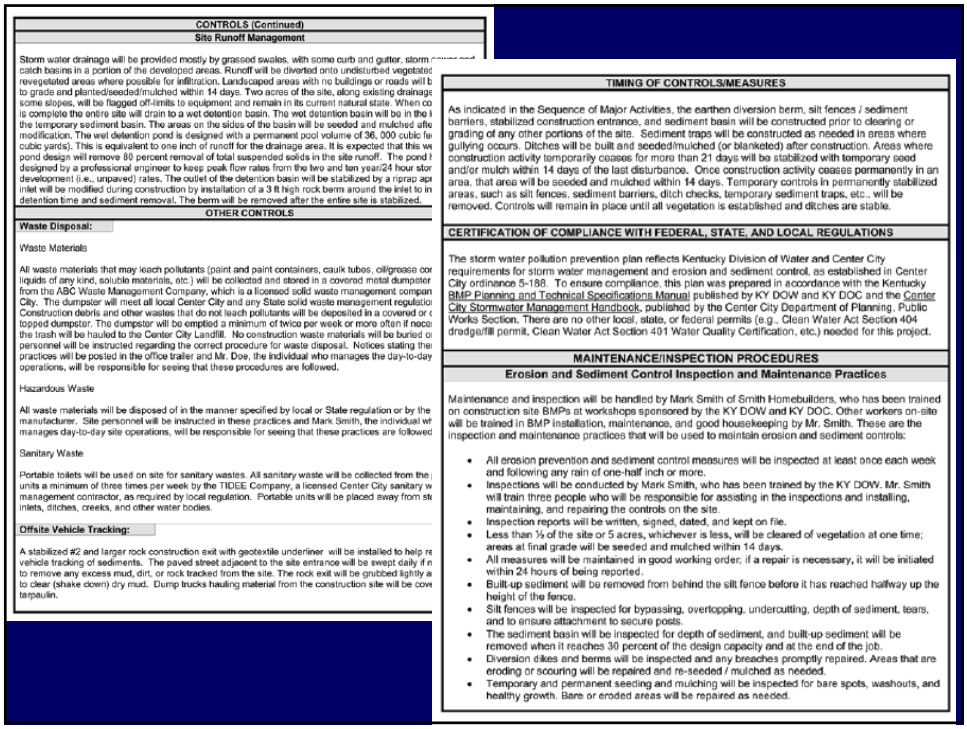
Temporary Stabilization – Top soil stockpiles and disturbed portions of the site where construction activity stops for at least 21 days will be stabilized with temporary seed or straw mulch no later than 14 days from the last construction activity in that area. The temporary seed shall be rye grass applied at a rate of 120 pounds per acre. Lime and fertilizer will be applied prior to seeding if necessary to establish the rye. After seeding, each area shall be mulched with at least 2,000 pounds per acre of blown or hand-scattered straw. The straw will be netted down or crimped into place by a disk harrow with the blades set straight. Areas of the site which are to be paved will be temporarily stabilized by applying geotextile and stone sub-base until bituminous pavement can be applied.

Permanent Stabilization – Disturbed portions of the site where construction activities are completed will be stabilized with permanent seed no later than 14 days after completion of construction in that area. Seed and mulch will be applied via hydroseeding/mulching or as described below. The permanent seed mix will consist of 80 lbs/acre tall fescue, and 40 lbs/acre kobe lespedeza. Lime and fertilizer will be applied prior to seeding if needed. After seeding, each area will be mulched with 4,000 pounds per acre of straw. The straw mulch will be netted down or crimped into place by a disk harrow with blades set straight. Ditches will be triple-seeded.

Structural Practices

Earthen Berm – will be constructed along the uphill perimeter (north) of the site. This berm will divert run-on around the construction site. Another berm on the east side will collect runoff from the disturbed area and direct the runoff to the sediment basin. Berms will be seeded and mulched after construction. Erosion control blankets will be used on top of seed in berm ditches with slopes of 5-10 percent. Turf reinforcement mats will be used in berm ditches with slopes exceeding 10 percent.

Sediment Basin – will be constructed at the common drainage location on the south side of the construction site. The basin will be formed by constructing an embankment across an existing gully and excavating a storage pond with a volume of 36, 000 cubic feet (1,333 cubic yards). The basin will drain through a corrugated metal riser and outlet pipe to a riprap outlet apron. The riser will have ½ inch holes 3-6 inches apart, with no large holes or slots in the lower two-thirds of the riser. Sediment will be removed before the basin is half full. Also, once construction activities are nearly complete, the accumulated sediment will be removed from the basin. The sediment basin and surrounding area will be seeded and mulched with blown straw immediately after construction. Basin will be modified with an inlet rock berm during construction.



CONTROLS (Continued)

Site Runoff Management

Storm water drainage will be provided mostly by grassed swales, with some curb and gutter, storm
catch basins in a portion of the developed areas. Runoff will be diverted onto undisturbed vegetated
revegetated areas where possible for infiltration. Landscaped areas with no buildings or roads will b
to grade and planted/seeded/mulched within 14 days. Two acres of the site, along existing drainage
some slopes, will be flagged off-limits to equipment and remain in its current natural state. When co
is complete the entire site will drain to a wet detention basin. The wet detention basin will be in the l
the temporary sediment basin. The areas on the sides of the basin will be seeded and mulched afte
modification. The wet detention pond is designed with a permanent pool volume of 36, 000 cubic fe
cubic yards). This is equivalent to one inch of runoff for the drainage area. It is expected that this we
pond design will remove 80 percent removal of total suspended solids in the site runoff. The pond l
designed by a professional engineer to keep peak flow rates from the two and ten year/24 hour stor
development (i.e., unpaved) rates. The outlet of the detention basin will be stabilized by a riprap apr
inlet will be modified during construction by installation of a 3 ft high rock berm around the inlet to in
detention time and sediment removal. The berm will be removed after the entire site is stabilized.

OTHER CONTROLS

Waste Disposal:

Waste Materials

All waste materials that may leach pollutants (paint and paint containers, caulk tubes, oil/grease cor
liquids of any kind, soluble materials, etc.) will be collected and stored in a covered metal dumpster
from the ABC Waste Management Company, which is a licensed solid waste management compan
City. The dumpster will meet all local Center City and any State solid waste management regulatio
Construction debris and other wastes that do not leach pollutants will be deposited in a covered or c
topped dumpster. The dumpster will be emptied a minimum of twice per week or more often if neces
the trash will be hauled to the Center City Landfill. No construction waste materials will be buried o
personnel will be instructed regarding the correct procedure for waste disposal. Notices stating thei
practices will be posted in the office trailer and Mr. Doe, the individual who manages the day-to-day
operations, will be responsible for seeing that these procedures are followed.

Hazardous Waste

All waste materials will be disposed of in the manner specified by local or State regulation or by the
manufacturer. Site personnel will be instructed in these practices and Mark Smith, the individual wh
manages day-to-day site operations, will be responsible for seeing that these practices are followed

Sanitary Waste

Portable toilets will be used on site for sanitary wastes. All sanitary waste will be collected from the
units a minimum of three times per week by the TIDEE Company, a licensed Center City sanitary w
management contractor, as required by local regulation. Portable units will be placed away from st
inlets, ditches, creeks, and other water bodies.

Offsite Vehicle Tracking:

A stabilized #2 and larger rock construction exit with geotextile underliner will be installed to help re
vehicle tracking of sediments. The paved street adjacent to the site entrance will be swept daily if n
to remove any excess mud, dirt, or rock tracked from the site. The rock exit will be grubbed lightly a
to clear (shake down) dry mud. Dump trucks hauling material from the construction site will be cove
tarpaulin.

TIMING OF CONTROLS/MEASURES

As indicated in the Sequence of Major Activities, the earthen diversion berm, silt fences / sediment barriers, stabilized construction entrance, and sediment basin will be constructed prior to clearing or grading of any other portions of the site. Sediment traps will be constructed as needed in areas where gullying occurs. Ditches will be built and seeded/mulched (or blanketed) after construction. Areas where construction activity temporarily ceases for more than 21 days will be stabilized with temporary seed and/or mulch within 14 days of the last disturbance. Once construction activity ceases permanently in an area, that area will be seeded and mulched within 14 days. Temporary controls in permanently stabilized areas, such as silt fences, sediment barriers, ditch checks, temporary sediment traps, etc., will be removed. Controls will remain in place until all vegetation is established and ditches are stable.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS

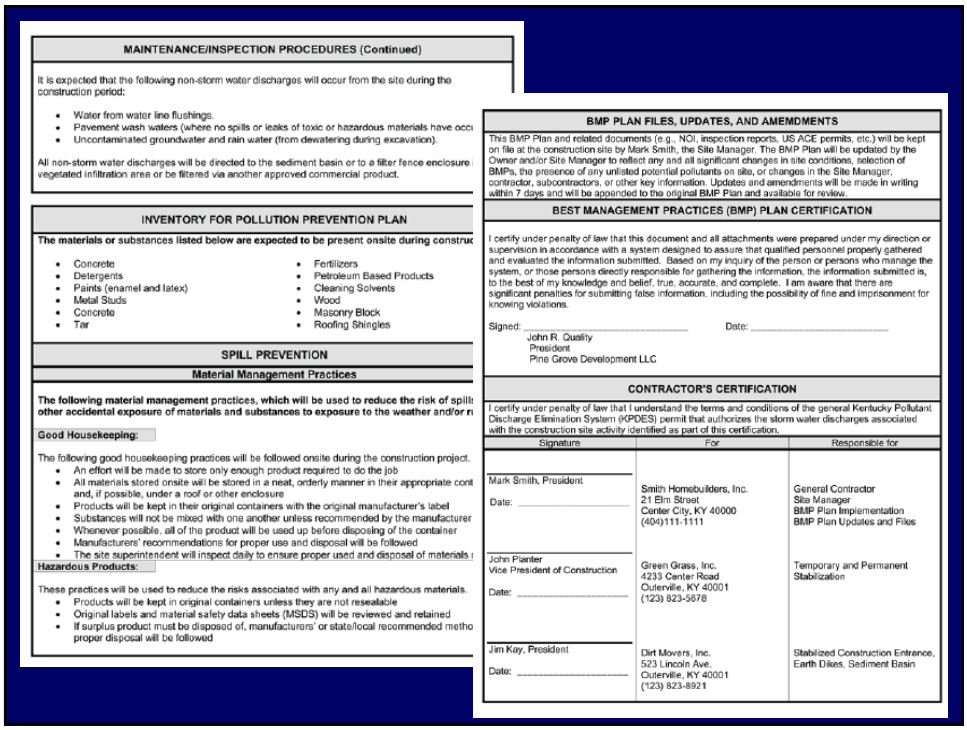
The storm water pollution prevention plan reflects Kentucky Division of Water and Center City requirements for storm water management and erosion and sediment control, as established in Center City ordinance 5-188. To ensure compliance, this plan was prepared in accordance with the Kentucky BMP Planning and Technical Specifications Manual published by KY DOW and KY DOC and the Center City Stormwater Management Handbook, published by the Center City Department of Planning, Public Works Section. There are no other local, state, or federal permits (e.g., Clean Water Act Section 404 dredge/fill permit, Clean Water Act Section 401 Water Quality Certification, etc.) needed for this project.

MAINTENANCE/INSPECTION PROCEDURES

Erosion and Sediment Control Inspection and Maintenance Practices

Maintenance and inspection will be handled by Mark Smith of Smith Homebuilders, who has been trained on construction site BMPs at workshops sponsored by the KY DOW and KY DOC. Other workers on-site will be trained in BMP installation, maintenance, and good housekeeping by Mr. Smith. These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- All erosion prevention and sediment control measures will be inspected at least once each week and following any rain of one-half inch or more.
- Inspections will be conducted by Mark Smith, who has been trained by the KY DOW. Mr. Smith will train three people who will be responsible for assisting in the inspections and installing, maintaining, and repairing the controls on the site.
- Inspection reports will be written, signed, dated, and kept on file.
- Less than ⅓ of the site or 5 acres, whichever is less, will be cleared of vegetation at one time; areas at final grade will be seeded and mulched within 14 days.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of being reported.
- Built-up sediment will be removed from behind the silt fence before it has reached halfway up the height of the fence.
- Silt fences will be inspected for bypassing, overtopping, undercutting, depth of sediment, tears, and to ensure attachment to secure posts.
- The sediment basin will be inspected for depth of sediment, and built-up sediment will be removed when it reaches 30 percent of the design capacity and at the end of the job.
- Diversion dikes and berms will be inspected and any breaches promptly repaired. Areas that are eroding or scouring will be repaired and re-seeded / mulched as needed.
- Temporary and permanent seeding and mulching will be inspected for bare spots, washouts, and healthy growth. Bare or eroded areas will be repaired as needed.



MAINTENANCE/INSPECTION PROCEDURES (Continued)

It is expected that the following non-storm water discharges will occur from the site during the construction period:

- Water from water line flushings.
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occ
- Uncontaminated groundwater and rain water (from dewatering during excavation).

All non-storm water discharges will be directed to the sediment basin or to a filter fence enclosure
vegetated infiltration area or be filtered via another approved commercial product.

INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be present onsite during construc

- Concrete
- Detergents
- Paints (enamel and latex)
- Metal Studs
- Concrete
- Tar
- Fertilizers
- Petroleum Based Products
- Cleaning Solvents
- Wood
- Masonry Block
- Roofing Shingles

SPILL PREVENTION

Material Management Practices

The following material management practices, which will be used to reduce the risk of spills other accidental exposure of materials and substances to exposure to the weather and/or r

Good Housekeeping:

The following good housekeeping practices will be followed onsite during the construction project.

- An effort will be made to store only enough product required to do the job
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate cont and, if possible, under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer's label
- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of the product will be used up before disposing of the container
- Manufacturers' recommendations for proper use and disposal will be followed
- The site superintendent will inspect daily to ensure proper used and disposal of materials

Hazardous Products:

These practices will be used to reduce the risks associated with any and all hazardous materials.

- Products will be kept in original containers unless they are not resealable
- Original labels and material safety data sheets (MSDS) will be reviewed and retained
- If surplus product must be disposed of, manufacturers' or state/local recommended metho proper disposal will be followed

BMP PLAN FILES, UPDATES, AND AMEMDMENTS

This BMP Plan and related documents (e.g., NOI, inspection reports, US ACE permits, etc.) will be kept on file at the construction site by Mark Smith, the Site Manager. The BMP Plan will be updated by the Owner and/or Site Manager to reflect any and all significant changes in site conditions, selection of BMPs, the presence of any unlisted potential pollutants on site, or changes in the Site Manager, contractor, subcontractors, or other key information. Updates and amendments will be made in writing within 7 days and will be appended to the original BMP Plan and available for review.

BEST MANAGEMENT PRACTICES (BMP) PLAN CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____ Date: _____

John R. Quality
President
Pine Grove Development LLC

CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the general Kentucky Pollutant Discharge Elimination System (KPDES) permit that authorizes the storm water discharges associated with the construction site activity identified as part of this certification.

Signature	For	Responsible for
Mark Smith, President Date: _____	Smith Homebuilders, Inc. 21 Elm Street Center City, KY 40000 (404)111-1111	General Contractor Site Manager BMP Plan Implementation BMP Plan Updates and Files
John Planter Vice President of Construction Date: _____	Green Grass, Inc. 4233 Center Road Outerville, KY 40001 (123) 823-5678	Temporary and Permanent Stabilization
Jim Kay, President Date: _____	Dirt Movers, Inc. 523 Lincoln Ave. Outerville, KY 40001 (123) 823-8921	Stabilized Construction Entrance, Earth Dikes, Sediment Basin

Thanks to:

Kentucky Division of Water
Kentucky Division of Conservation
Kentucky Transportation Cabinet
Technical Advisory Committee
US EPA HQ and Region 4